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Site Selection Initial Checklist
for First GeoMicroDistrict Installations in Massachusetts

Geology & Hydrology

- ❑ **Access to thermal storage:**
  - ❑ **Bedrock**
    Bedrock provides good thermal conductivity for thermal storage. Almost all of Massachusetts (with the exception of Cape Cod, the islands and portions of southeastern Massachusetts) has bedrock at an average depth of 35 feet, which can generally result in a cost-effective borehole installation.
    - Well completion reports at the Massachusetts Department of Environmental Protection (MassDEP) can provide information on specific sites.
    - A test borehole with formation thermal conductivity test will help provide location specific information.

  - ❑ **Surface or groundwater resource**
    Access to a river, aquifer or the ocean is a potential thermal source so long as the loop is closed and any thermal shifts are within a permitted range that ensures no negative impact on the body of water.

- ➢ **Note: Groundwater quality & flow**
  This is essential information for design to ensure the thermal storage is calculated correctly and the grout is consistent with local water conditions. The salinity of the groundwater is especially important to the selection of effective grout material and is more likely to be an issue in a coastal setting.

Buildings

- ❑ **Mixed cooling and heating use**
  Connecting buildings with different energy needs will allow for a greater system efficiency and require a smaller borehole field, reducing costs. For instance, an office building requiring cooling can heat several homes with the shed energy.

- ❑ **Few buildings with steam heat**
  A water source heat pump currently cannot efficiently provide the heat needed for steam radiators, thus steam systems need to be replaced in any buildings connected to the pilot, increasing the cost for the pilots.

- ❑ **Adequate electric panel capacity and wiring**
  A significant percentage of homes do not have the needed electric service and legal wiring to run a heat pump. Evaluating the electric capacity of the buildings will help ensure the project budget can meet the needs.

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Street Conditions

- ❏ **Gas right-of-way in the street has enough space**
  The closed-loop boreholes will be about six inches wide and a few hundred feet deep, spaced as close as every 20 feet. The shared loop of water (ambient temperature) would run along the street, with service lines going to each building, mirroring the gas main and services. The shared loop pipe and services would often have a larger diameter than the original gas pipes. Check with Dig Safe and the municipality to ensure the design works with existing street infrastructure.

- ❏ **No subsurface contamination issues**
  Subsurface contamination records may be found in the MassDEP Bureau of Waste Site Cleanup online databases. Urban and industrial street areas may contain soil and groundwater contamination that could be encountered during borehole testing, drilling and lateral pipe installation. Any soils or groundwater encountered that appear to be potentially contaminated by oil and/or hazardous material should be assessed and managed according to the Massachusetts Contingency Plan 310 CMR 40.

Participants

- ❏ **Willing**
  You don't want to foist a pilot on anyone since that will not encourage long-term acceptance. Customer outreach can be done on the basis of improved safety (no explosive gas in the building), lower energy bills, air conditioning, and improved indoor air quality through lack of combustion.

- ❏ **A mix of income levels**
  In terms of the first few pilots, a mix of socioeconomic backgrounds will ensure the greatest learning for further roll out of the system.

- ❏ **Includes current gas customers**
  To ensure that gas customers are benefitting from the ratebased expense.

Economic Considerations

- ❏ **A street with planned repaving or underground utility work**
  Sharing the repaving costs between municipalities and utilities can help reduce overall costs and street disruption for residents.

- ❏ **A street with leakprone gas pipe or other utility work**
  Rather than replace aging gas mains with new gas pipes (since given the state's 2050 net zero plan new fossil-fuel pipes are likely to be abandoned before they are paid off), it would be smarter to install instead this renewable thermal infrastructure.

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- ❑ **A neighborhood with gas constraints**
  Taking some buildings off of gas could reduce local supply constraints, reducing or deferring expensive upgrades to the system.

- ❑ **Nearby street segments with leak-prone gas pipes**
  Consider each installation as a "seed" that can grow. Siting the first install near additional streets with leak-prone gas infrastructure scheduled for replacement could facilitate system growth.

- ❑ **Nearby buildings with high cooling needs**
  Also look for opportunities for expansion to nearby buildings with cooling needs such as hockey rinks, office buildings, supermarkets, etc. and buildings with heat needs such as homes. Growing the system in a way that continues to balance heating and cooling needs reduces the cost of the needed installation.

Permitting

- ❑ **Wetlands Protection Act**
  Drilling activities and trenching work within 100 feet of a wetlands may require the filing of a Notice of Intent (NOI) with the local conservation commission. If the work is within the 100-foot wetlands buffer zone, you may submit a Request for Determination Application (RDA) to the conservation commission. If your RDA is approved, you won't be required to submit the NOI.

- ❑ **Chapter 91**
  Chapter 91 regulates activities on both coastal and inland waterways, including construction in tidelands, great ponds and certain rivers and streams. Any structures, filling, dredging, change in use, structural alteration or demolition require authorization from the MassDEP Waterways Protection Program.

- ❑ **Rivers Protection Act**
  The riverfront area is a 200-foot wide corridor on each side of a perennial river or stream, measured from the mean annual high-water line of the river. In some densely developed cities, this corridor is only 25 feet. Any work within these corridors should be first checked first with the local conservation commission or a MassDEP Wetlands Circuit Rider. It may require the filing of an NOI with the local conservation commission.

- ❑ **Massachusetts Environmental Policy Act (MEPA)**
  The MEPA Office conducts reviews of environmental impacts of development projects and other activities that require one or more state agency action. Check with the MEPA office around potential sites before finalizing the site.

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- ❑ **Designations such as Areas of Critical Environmental Concern**
  Areas of Critical Environmental Concern (ACECs) are places in Massachusetts that receive special recognition because of the quality, uniqueness and significance of their natural and cultural resources. It is a good idea to make sure the site is not on the ACEC statewide map (available on Mass.gov).

- ❑ **Massachusetts Geothermal Drilling Guidelines**
  Make sure the proposed borehole and system design meets the MassDEP Underground Injection Control Program's document titled 'Guidelines for Ground Source Heat Pump Wells.' Contact the MassDEP Underground Injection Control Registration Program if you propose to use materials of construction or chemical additives not included in these guidelines.

- ❑ **Municipal grants (i.e. a permit)**
  Make sure you get a street occupancy permit from the local municipality.

- ❑ **Local Board of Health**
  Check with the local board of health about local rules regarding required setbacks for geothermal boreholes from private drinking wells. Most local boards of health or health departments require a local well drilling permit for the installation of both open- and closed-loop geothermal wells. In some larger cities, there may be another local government entity that issues such permits.

- ❑ **MassDEP Certified Well Driller**
  Any well driller hired to drill and install a geothermal well must be a MassDEP Certified Well Driller.

- ❑ **Management of Drilling Fluids**
  Installing wells on a street, especially in an urban setting, often creates challenges related to the management of the drilling fluids generated. In some instances the fluids may be contained and transported to an area where the fluid can be responsibly discharged. Alternatively, discharging to a nearby stormwater conveyance system may require local approvals and may require a National Pollution Discharge Elimination System (NPDES) construction dewatering general permit from the Environmental Protection Administration, depending upon the point of discharge of the stormwater system. Filtration to remove most of the sediments from the drilling fluid would typically be required for stormwater discharge.

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